



Nature Conservation and Economic Realities

Prakash Gole

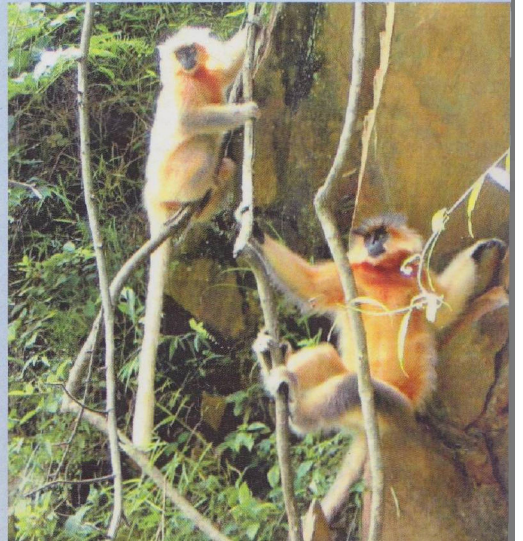
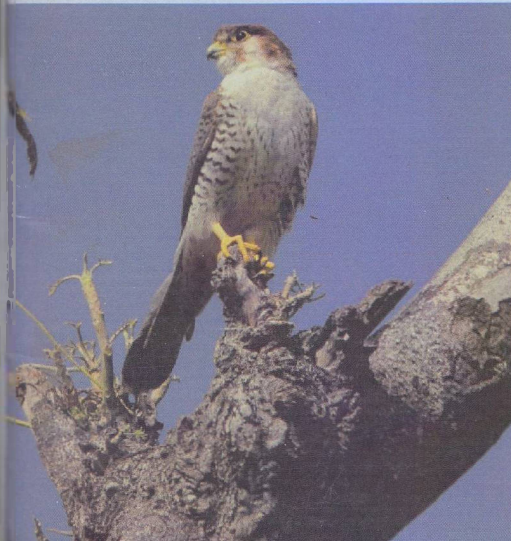


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Front Cover

(From Top to Bottom, Left to Right)

Nilgiri Tahr

Red-necked Falcon, Golden Langur

With Best Compliments

Prakash Gole

**Nature Conservation and
Economic Realities**

Prakash Gole

The Ecological Society

**Special Publication on the 25th Anniversary
of the Ecological Society**

2007

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Foreword

What are the economic realities that affect conservation of Nature? Predominance of the 'Technological Man' in the upper echelons of Indian Society, seems to be factor number one! After all, what is technology? It is nothing but directing natural flows of energy and materials towards human beings. As humans advance technologically, less and less is available for non-human beings in terms of energy and materials. It will affect all nature's components and nature's processes which are the result of evolution. If carried to extreme, it will disrupt life on the planet. Are we aware of the implications of technological advance in all its respects? Little evidence is forthcoming about this!

The second factor seems to be practising economics as a completely amoral science. Translated into economic policy, it means consumer sovereignty is supreme irrespective of the quality of consumer choice. It also neglects the issue of whose choice is recorded in the market. The result of such economic policies is strikingly apparent in India's urban areas. Urban people are increasingly being directed towards conspicuous and ostentatious consumption. These consumer demands can only be met with intense exploitation of Nature, creating further imbalances in natural systems and processes.

Is Nature already doomed? Or can we still salvage, recover it? A landscape approach in economic and social policies, providing space and resources for non-human beings and natural processes, seems to be the only solution. In practice, it

means restraining consumer sovereignty. Spiritual and moral forces are required to bring in voluntary restraint. Ecological Society's experience in the last 25 years has shown that only inter-disciplinary education promotes the required balance between scientific truths and compulsions on the one hand and social, moral responsibilities on the other. We need a holistic approach in solving all our problems. This approach, essentially means reconciling scientific truth and economic realities with spiritual, moral and social responsibilities.

As Ecological Society steps into 26th year, we hope to work for an educational pattern that will promote a landscape approach and holistic solutions to life's problems.

Prakash Gole
Editor

Nature Conservation and Economic Realities

Are economic development and conservation of nature mutually exclusive? For many of us it is a sad but inevitable reality. Once economic development is achieved, nature conservation can be taken care of, believe many others. Some may even think that technology is a wonderful substitute for nature. Eventually enough technical progress will obviate the necessity of having nature around. It looks therefore, that a majority in this country thinks that extinction of species, annihilation of wild populations, destruction of natural habitats is a small price to pay for garnering the fruits of economic development. So the nation marches on leaving in its trail wildlife carcasses and the shrill cacophony of protesters and agitators who are deprived of their livelihoods.

As monuments to human scientific progress are erected on the debris of natural systems and deprived humanity, it is time to enquire about the origin and development of the all-pervading economic system, the nature of forces that propel it in particular directions and the circumstances which moulded the human psyche in its favour.

What is this economic system that enables us to engage in the exchange of commodities and money, trading and manufacturing, export and import, saving and investment, lending and spending and which makes some people poor and others rich? Well, it all began millions of years ago when human

beings were hunters and gatherers living off the fruits of solar energy converted by plants and animals into food - carbohydrates and animal tissue.

The Barter System

In the hunting and gathering mode of early human life, the initial transactions must be quite accidental. In their quest for food people must have discovered certain attractive items in nature such as sparkling stones and gorgeous feathers, cherished their valuable possessions and then desired to enhance the value of their possessions by acquiring what is valuable to others through exchange. When two persons decide to exchange their valuable possessions, they are convinced that the items involved in exchange are equal in value, but for each one the mental satisfaction in acquiring the others' valuable possession is higher than the loss incurred in parting with one's own valued thing. The act of exchange is desirable, worth indulging into, as it enhances the mental satisfaction of both participants. This simple exchange of two goods or commodities, without involving money, is called Barter. The Barter spreads as people come to realise that it is a desirable act, giving mental satisfaction to both parties.

Once this is realised, accidental finds from nature are no longer sufficient as people then start searching for attractive items in nature. They spend effort and time in looking for such attractive items. They naturally assume that the more the value of an item, the more the effort and time involved in finding it. The assumed value is in proportion to the cost in terms of labour and time incurred in finding the item. Now when a barter takes place and two commodities are exchanged, each one reaps a profit as each one feels that the commodity one is acquiring has a higher value than the one that is given up. The exchange is worthwhile as the cost in terms of labour and time is more than compensated. Such an exchange is an economic transaction as it involves cost and a surplus for both in terms of enhanced value. The economic system is gradually built-up when such economic transactions multiply.

The Barter system, though desirable, has its limitations. Distance wise it is confined to particular place or places where it is possible to search for attractive, exchangeable items. If the

items are not durable, they cannot be stored and the satisfaction desired from exchange is only temporary. If the items cannot be easily carried or transported, the exchange is confined to a limited area. Because of these limitations barter was eventually replaced by a system involving an acceptable medium of exchange. The change came about as humans' brain power increased and as people became more and more acquainted with their environment and aware of the potential of nature surrounding them.

One must pause here to take note of the fact that the basis of economic transactions was nature - items from nature. This basis is not changed even in modern times as 70% of all goods traded still originate in nature. It is worthwhile to have nature around, as long as human beings survive on this planet!

The Nature of Trade in Ancient Times

Of course, nature is not equally favourable to all regions; some are better endowed with it than others. One of these better regions in ancient times was Phoenicia, a little corner on the eastern shore of the Mediterranean Sea. It was one of the most fertile regions of the ancient world. The soil was rich enough to produce wheat, olives, grapes and other fruit; forests harboured such valuable trees as pines, cedars and cypresses. The sea nearby abounded in fish, especially the purple murex and fine sand on the seashore provided useful materials for glass industry. Phoenicians were innovative enough to convert nature's gifts into natural resources producing wealth. In the mountains there were strata providing marble, lignite and iron from which phoenicians produced various artefacts. Wine was produced from fruit and valuable timber from forests was used to build seagoing vessels to further trade.

Merchants were supported by a powerful state. This support enabled merchants to undertake long distance voyages. They discovered silver in Spain and tin in Britain. Gold was obtained from the African interior (Ethiopia). Their extensive contacts enabled them to trade in metals, timber and artefacts made from them. On the basis of trade with south and east Asia, skillful craftsmen from Phoenicia produced wonderful jewellery, metal and glass bowls and items from ivory. Food stuff was obtained from their colonies, e.g. grain from Sardinia and wine and oil

from Sicily. As natives did not fully appreciate the trade value of most of these resources, Phoenicians could acquire them cheaply. Their seafaring, industry and craftsmanship enabled them to amass fabulous wealth. Carthage, their principal city, rose to world-wide fame. This was an era before the birth of Christ.

It was Phoenicians who started using gold and silver as medium of exchange in trade and commerce, in a major way. Soon these precious metals became the monetary standard throughout the ancient world as trade and business contacts were built up. The use of precious metals as medium of exchange also meant trade in high value goods. The long-distance, across the border trade was mainly confined to high-value, durable, luxury goods desired by the wealthy and the powerful.

Chinese and Indian traders replaced Phoenicians in the early Christian era, and political powers in the middle east and Europe developed great interest in goods from the East. Indians excelled in sea-faring as teak, another valuable timber used to build sea-worthy ships, could be found and grown on or near their sea coasts. Their trade was also more or less confined to high value goods. The trading items included silk, velvet and luxury clothing inlaid with gold and silver, precious stones and jewellery, crafted items from ivory and jade, marble, wooden and fur items, shawls, crafted goods from porcelain and mother of pearl, spices and condiments, leather and leather goods, ornamental birds and animals, teak, sandalwood and other valued timber, printed cloth etc. Indians and Chinese also amassed wealth in trade with Asia Minor, and the Roman Empire and south-east Asia. They were followed by Arabs who initially played the role of middlemen and later made voyages to India and east Asia. The trade again was mainly confined to valuable commodities desired by rich and the powerful.

Common man's needs of food, clothing and shelter, the basic necessities of life, were met by goods produced locally with local resources. The resources mainly came from the countryside and agriculture. At the village level Barter was still the dominant system of exchange. Groups of villages depended on particular trading marts or centres located conveniently on trading routes. Cheaper metals such as copper, brass, nickel and tin were used as medium of exchange in local trade.

Such simple, barter transactions can still be witnessed in

rural India today. The weekly village bazaars or markets held at a convenient location, generally have a section where commodities are bartered. For tribals visiting village markets, it is a very convenient mode. In fact a large part of India's internal trade and commerce is based on simple, informal transactions, and is generally termed as unorganised economic sector. The trade and transactions using currency, (called legal tender) and modern credit instruments involving banks and insurance, form the organised economic sector.

Wealth creation in a society depended not on such simple, unorganised transactions but on transactions in high value goods with gold and silver as medium of exchange. These transactions gave rise to an affluent class of merchants and moneylenders in a society. Kings and emperors desired revenue for their treasuries by imposing taxes and duties on trade. Some of these moneylenders were rich enough to advance loans to kings and emperors in gold or cash to keep a standing army or to wage a war. History is replete with incidents when kings and their marauding armies had robbed these merchants and confiscated their wealth by sheer force.

Common people, with their transactions mostly confined to necessities of life, hardly had opportunities to accumulate wealth. Their transactions many times did not involve money and profit-margins were either very small or non-existent. Most of their time spent in earning their daily bread, the common people had little opportunity to handle cash or hoard it. Savings were dependent on miserliness.

The Mediaeval Times in India

For north India these were tumultuous times with foreign invaders plundering and looting or consolidating their oppressive rule. Muslim rulers imposed back-breaking taxes on agriculture, cattle herds and non-believers. Loot, plunder and extortion were a daily experience of common people sapping their energies either to work or save. Destitution and deprivation was their lot. State treasuries were mainly dependent on receipts from duties levied on exports and imports. Trade in high-value goods and luxuries was connected to the ostentatious living of rulers and their henchmen. But wealth in the hands of rich merchants hardly ever led to productive investment, as

apprehensions of civil war and plunder always loomed large. They would hide their wealth rather than use or spend it. Even if wealth was created it hardly ever led to investment in public works or any other public utility. Public welfare depended on the wisdom or inclination of kings or others holding power. Economic transactions in the society depended on whims and indulgences of the rich and the powerful rather than governed by any system of law and judiciary.

South India was relatively free from foreign invasions. Dynasties like Rashtrakoot, Chalukya, Chel, Chol, Pandya, Kadamb encouraged internal and overseas trade. Trade relations were built and maintained with Arabs and Muslim rulers to the west and northwest and to the east and south-east with Java, Sumatra, Bali, Malaya, China and Indochina (Laos, Vietnam and Cambodia). Social life in the south was comparatively free from violence, pillage and other ravages. Economic condition of the common man was therefore, better than their plight in the north. Wealth created through trade etc. was therefore, directed to such works as building temples and public charity, charitable homes and public utilities such as roads and housing, building religious and grammar schools etc. Comparatively peaceful and benign conditions prevailed even after the fall of Vijayanagar empire and right upto the times British and other westerners entered India.

In the 18th century British merchants opened their trading post near Madras (Chennai) and entered into trading relationship with locals. They were then impressed by the industriousness and comfortable standard of living of the people. In the account of their travels in the countryside, they observed, "People in this region are generally educated and well-versed in their profession and trade. Farmers are very knowledgeable and use ingenious techniques. The implements they use are technically perfect and we recommend their adoption in farming in Britain.

"In their diet people use as many as 45 different grains and pulses and a variety of spices and condiments. Daily necessities are inexpensive so much so that a lowly agricultural worker earning just Rs.5 per month, can afford to have butter on his daily rice. The income of the courtier commanding a garrison and fort is Rs. 150 per month allowing him to display pomp and

luxury befitting his high position. Income inequalities in the society are not crippling."

Such an account is sure to make today's Indians envious of their brethren in not too distant past!

Renaissance in Europe

Bulk of the trade between Europe and the East, moved over land through trade routes that traversed Asia minor (West Asia) and regions around the eastern Mediterranean. Sea routes from India and the south-east transported goods to Gulf of Iran and Hormuz straits (Gulf of Oman) from where wares travelled through Iran and Turkestan towards Europe. But this route became hazardous as political conditions worsened in the region, in the 7th Century. Later Arabs came to dominate those lands and extended their rule to Cyprus, Sicily and southern Spain. They were instrumental in delivering Indian mathematics and astronomy to the west. From China they transported the compass and other navigation aids, mechanical clocks and handlooms. In Europe they established libraries with collections of handwritten and handcrafted texts.

Religious wars or crusades began in the region between Christians and Muslims in the 10th Century. In the next 100 years Europeans succeeded in removing Arab rule from Sicily, Sardinia and Corsica. But by that time they had acquired from Arabs the technique of making gun powder (originally developed in China) and had become familiar with tropical crops such as sugarcane and cotton. They even learnt to produce silk from silkworms. Later Portuguese transported these crops to American continents.

As trade halted during the period of Crusades, Europe was forced to look to its interior areas for resources. Forests of Russian Taiga were explored and produced timber, valuable fur of animals, salts, bitumen and even honey and hessian. Sugarcane and indigo were produced in Sicily; better navigation led to greater exploitation of marine fish and whales were almost decimated from European seas for their fat and oil. As religious wars subsided, trade in tobacco, indigo, cotton, rice and sugar began to be restored. Europeans facilitated transport and storage by improving ports and trading centres.

The nodal point for the overland trade was Constantinople

(Istanbul) strategically located overlooking the Black and the Mediterranean waters. Its rulers were christians interested in facilitating trade and culture. However, the city was annexed by Turks in 1453 leading to closure of trade routes. The city was home to a number of leading lights in various branches of knowledge. They fled west and carried their expertise to Europe. Familiarity with Greek knowledge and culture increased in Europe as libraries established by Arabs, came into their possession. The eminent people who migrated to Europe from Constantinople greatly augmented this knowledge base.

This was the beginning of an intellectual awakening in Europe. People began to question the word and authority of Pope. Greek theories about natural phenomenon contradicted the theocratic pronouncements. Nations like England and Holland repudiated the church and vatican. Aristotle's writings induced people to become more observant and inquisitive about natural phenomena. Such observations laid the foundations of sciences such as physics, geology and astronomy. Alchemi was transformed into the science of chemistry. Refinement of navigational aides improved sea-faring. Strong, ocean-going ships were built and came to be fitted with powerful guns to repel pirates. Adventurous voyagers and bucaneeers opened up new territories in north and south America, Africa and Australia and New Zealand. Supply of fertile land was no longer limited to Europe and parts of Asia. In Europe availability of usable land per head increased from 24 to 148 acres!

Renaissance, the intellectual awakening in Europe, led to general spread of education. Invention of printing press promoted circulation of pamphlets and books. The general public became more conscious about health and hygiene and there was perceptible increase in the marriageable age of women. Agricultural reform resulted in enclosures, enlarging the size of fields and replacing serfs by paid labour. Serfs who lost their livelihood, were later absorbed in newly emerging factories and trading establishments.

Trade leading to Economic Power

As precious metals were the accepted medium of exchange, it was necessary to hold adequate stocks of gold and silver to establish trading relationships. Kings and rulers began therefore,

searching for places where these metals could be mined. The successful ones then could exercise power to buy any item or service from anywhere in the world. Stocks of precious metals enabled rulers to raise armed forces, used whenever necessary to conquer new lands and resources. Wealth and economic power could be built only through substantial profits in overseas trade promoted by stocks of gold and silver.

This spurt in business and maritime activity gradually established in Europe a class of merchants adventurers, enterprising and rich enough to face rulers on almost equal terms. Rulers realized that it was cheaper and easier to raise revenue by taxing trade than confiscating wealth using force. Europe was free from foreign invasions since the 15th century. Muslim powers were stopped in Eastern Europe and could not advance further. Given the physical realities of the European landscape, empire-building was difficult. Europe is conveniently divided into fertile river basins separated by mountains and the sea. Each river basin produced enough agricultural surplus to evolve a distinct culture and polity. But none of them could become so powerful as to overwhelm others. Empires are more prone to use force and violence and to exercise unlimited power, as was the experience of Asian Societies throughout the pre-modern period (Before 18th century).

Economic transactions can only become fair and just if there exists a system of law and justice. Public services and utilities can only be built up if such a regime exists. The oppressive and cruel rule of foreign invaders deprived Asian Societies of any semblance of fairness and justice and any development of public services.

Absence of imperial rule promoted competition in international trade among the European states and rulers found it expedient to support merchants in order to reap benefits in terms of tax receipts from the trade. The endowment of charters, trading rights and a variety of agreements between the state and traders gradually developed a system of rules and regulations and laws governing transactions. A judicial system developed side by side as disputes and wrangles between different parties had to be resolved. Erstwhile 'Guilds' representing traders and artisans and their monopolistic control over transactions and trade fell into disuse as companies organised by enterprising

traders and entrepreneurs started functioning. It is these companies which undertook utility works such as roads and bridges, improving ports and warehousing etc. to facilitate trade. The payment that serfs had to hand over to the lord, had to be given in cash instead of grain, as lords began favouring cash to grain. This encouraged the serfs to send their produce to the market for sale, get cash and then pay a part to the lord. Such increase in transactions led to the creation of trading marts at convenient places where a variety of goods could be traded. Roads and bridges facilitated transport of goods and even labour. River and maritime transport reduced the cost of movement of goods and labour. As commodity trade grew, small-scale industrial and artisanal activity spread throughout village homes and farms. Spread of education had made people more inquisitive and innovative. Tools and implements used in trade and village craft were improved and refined and new metals and chemicals brought into use and wind mills set up to lift water. Selective breeding improved the quality of livestock; dairying and animal husbandry supplemented agriculture. Plantations of trees and fodder varieties were taken in hand to assure supplies of fuelwood, forage and timber. Harvesting of fish from freshwater and the sea also improved. On the farm horses replaced bullocks which led to improvement in the quality of fodder and forage. People's diet came to include more proteins as the importance of animal husbandry increased. Health and hygiene began to improve as spread of education made people more aware of sanitation, water quality etc. As common man's purchasing power increased, the quality of housing became better and bricks and tiles replaced wood. Incidence of fire therefore, declined.

Nature carries the Burden of Human Civilization

As agriculture spread and trade, commerce and industry proliferated, nature began to lift an increasing burden of human progress. Reduction in forest cover was the most visible impact. In Europe the first to go were scattered Mediterranean region forests as evergreen oaks and pines have relatively slight regenerative power. It was replaced by scrub and wasteland and some species became very rare. Deforestation was complete by 5th century B.C. In northern Europe, oaks and beeches were

replaced by conifers. The loss of forest was accelerated in the middle ages and then the spread of Christianity contributed to it as forests were identified with savagery. France lost $2/5^5$ of its forest to cultivation. The spread of pasture also led to forest clearance. Christian monasteries encouraged forest clearance in Germany and in the 12th century Slavic tribes began to cut forests in Poland and further east. By 16th century the demand for wood greatly increased as ship-building and smelting progressed. Wars between France and England and wars in different parts of continental Europe also ravaged forests. Fragments of forests remained as islands in a sea of civilization.

Large mammals suffered as their habitats were transformed and subdivided. Auroch the ancestor of domestic cattle, was the first to succumb, the last one died in 1627. The Caucasian bison has completely disappeared while European bison survives in small numbers on the border of Poland and Russia. Herbivores such as the Ibex and the Chamois survive on the brink of extinction. Among the carnivores the Lion became extinct in the 1st century A.D. Bear is restricted only to the Pyrenees. Wolf survives in Spain, the Balkans and Russia. All these animals fell to excessive hunting pressure. Hunting decimated many birds also, like the waldrapps and the capercaillies. Birds of prey like eagles and hawks were also hunted to extinction and vultures like lammergeir suffered due to habitat loss and lack of food.

In the 14 million square miles land area of tropical Asia, population continues to be far denser than in Europe. Deforestation due to population pressure was heavy on the Chinese plains, in Java and parts of Philippines. Agricultural practices, especially shifting cultivation, also led to deforestation and loss of regeneration. Cultivation was restricted in many parts of Asia such as India where only 30% of the land was farmed. Transformation of habitats was a more gradual process than in Europe allowing the fauna to adapt or to take refuge in relatively undisturbed areas or mountains. Benign religious practices also offered protection to fauna.

Overhunting and strange medicinal demands contributed to the demise of the rhino, all its forms, the Indian, the Javan and the Sumatran, now remain in small populations restricted to a few isolated areas. Elephant and Tiger populations have shown a gradual but continuous decline and while Asiatic lion survives

only in the Gir National Park in India, the Cheetah has disappeared altogether. A few bird species suffered but none became extinct, during the Middle Ages.

Northern Asia was more or less inhabited during this period. But in the steppe the Saiga antelope was almost annihilated due to overhunting, wild camel and wild horse have also been decimated to extinction, so also were victimised Syrian wild asses, the onager and the Arabian oryx.

The European exploration of the high seas, the Pacific islands and such isolated areas as New Zealand brought about the demise of many a species as these fell to the hunter's gun or to the introduction of cats and rats. Moa of New Zealand was exterminated by local Maories before the entry of the white man. Ground dwelling parrots, and rails were destroyed by pigs and rats who ate their eggs. Introduced dogs, cats, mongooses and goats also outcompeted many species and led to their severe decline or extinction.

European colonization of many islands led to deforestation, loss of habitats and forest fragmentation. Sport hunting, plume hunting, scientific collections, hunting for furs and skins also had their share in massacres of animals and plants in Japan, Malaya, Borneo and New Guinea.

As human beings inaugurated the age of industry and technology, these massacres were by no means reduced but gained accelerated momentum as new agents of destruction such as pollution and pesticides entered the area. Are human economic progress and nature conservation inversely related? What are the economic realities that make inevitable the destruction of nature?

The 'Backward' Asian Societies

A look at the Asian social scene of the Middle Ages seems to reinforce the saying that human societies' 'backwardness' and nature conservation are positively related. While Asian societies probably scored higher than European ones in terms of preservation of natural habitats and species, Europe was far ahead of Asia at the end of 18th century in economic, social, political and scientific progress. Why is it that Asia lagged behind Europe?

Till the 8th century Asia was ahead of Europe not only

culturally but also in the fields of science and technology. The decline of culture and science was more due to 'barbarian' invasions from foreign lands than to internal degeneration. This coupled with the vagaries of weather and fragility of environmental factors sealed the fate of Asian Societies.

Since the 7th and 8th centuries prosperous Asian societies were constantly under attack of nomadic tribes and others who rode from the central Asian plains and regions on the north-east and east of the Mediterranean. The invasions in their initial stages involved loot and plunder but later, as these foreign invaders consolidated their power, they unleashed their reign of terror and extortion with predatory taxation and brutal treatment of non-believers. They also systematically destroyed the treasurers of knowledge and learning. While Europe benefited from Arab invasions which brought with them Eastern innovations and science, Asia suffered at the hands of people who were far inferior to Arabs in knowledge and culture. Such rampant destruction checked the spread of knowledge, sapped the energy of the people and resources of the land, made agriculture hazardous and reduced the populace to destitution.

For centuries the alien rulers exercised unlimited power which meant absence of the rule of law, of a judicial system and any semblance of public utilities and services. As public institutions were not allowed to develop, social and economic transactions became mired in corruption, deceit, coercion and blackmail. The once tolerant and vibrant society became constricted in its vision and began to be suspicious and intolerant of each other. In India caste divisions became sharper and the society lost its unity and cohesion. Even trade and commerce suffered from such evils and an enterprising and daring merchant class failed to develop. As ownership of land and resources constantly changed, no developmental investment was ever possible. As such public utilities and services such as roads and bridges, transport and communications, ports and warehousing remained primitive.

When British rulers in India established cantonments on the periphery of Indian towns, these establishments were provided with public services such as sanitation, police, a system of law and justice etc. Some Indians thus preferred to shift and started living in the cantonments. Such public services were unheard of

in Indian towns!

Some writers have emphasised that vageries of monsoon rendered any investment in land development hazardous. They pointed out that whenever rainfall was normal, the average production in south and south-east Asia was higher than in Europe. But hazards of drought or excessive rain increased the risk factor in agriculture. This deterred investment in land. Others have argued that in a tropical climate the incidence of contagious and waterborne diseases is always greater than in cold climates. This reduces human work efficiency and power of resistance to disease. Famines and epidemics became more frequent in India as contacts with foreign nationals increased. Their frequency increased further since the 18th Century.

It is also the contention of some authors that incidence of earthquakes, floods, droughts, fire has always been higher in Asia than in Europe. Consequently destruction of natural resources and capital built up by human civilizations had also been greater.

On the social side institutions delivering secular education never developed in Asia. Printing press arrived in Asia much later than in Europe. Intelligentsia as a social class developed much later and the spread of interest in natural and physical sciences also came much later. There was also a social ban on sea voyages and the introvert society neglected and ridiculed new ideas, innovations, sciences and even new weapons. Education, Science, technology did not receive State patronage. They were conveniently imported from foreign lands. The influence of abstinence and metaphysics in religion made people self-righteous and uninterested in material progress. Literature and art, artisanal skills and crafts lost their dynamism and remained immersed in traditionalism.

European culture, with its advancement in general education, in health, hygiene, in science and technology and with its spirit of enterprise and adventure proved therefore, far superior to Asian cultures and could dominate Asian Societies.

The Birth of Modern Economics

The intellectual renaissance in Europe saw its inevitable culmination in what is known as the Industrial Revolution, Profits earned in trade, especially international trade, formed the

basis of industries in earlier stages. Commercial use of inventions such as the steam engine became possible as the required capital investment could be made from wealth created through trade and commerce. Factory production began in the 18th century and became common in the 19th. The production system changed radically as the pace of production quickened and output was of a uniform standard. The product was cheaper also as there was saving in terms of time and labour. It became easier to cater to the demands of the public and the popularity of the new production system increased. Coal and iron became the basic raw materials for this system and geologists and entrepreneurs began prospecting for these materials. Enough stocks of these minerals were located in England to give it a leading position in industrial production.

Machines essentially are a labour-saving device. They ensure uniformity even in repetitive movements. But as a machine does the work of 10 or 20 labourers, it demands nourishment in equal measure. Machines work continuously and efficiently when raw material, energy and labour are given to them in required quantities, which means that a manufacturer must have adequate stocks of all these things to feed the machine. For European nations it was not difficult to ensure adequate supplies of all the essentials as iron and coal mines were located within the continent itself and labour mobility assured a continuous flow from different regions. England's lead in production depended a lot on labour from the European continent. The other materials increasingly came from European countries in Asia, Africa and America. The rate of production improved further as production came to be based on division of labour. Basic necessities like clothing and a variety of household items could be provided cheaply and in adequate quantities. Industrial production thus became popular and consolidated its hold on the general public.

The Industrial Revolution was spurred mainly by individual enterprise and innovations supplemented by business acumen of those who provided capital and organisational skills and efforts of individual managers and skilled workers contributed to its spread. It was not helped by political or administrative support from the State. No such influences interfered with buyer's demands, the individual buyer or consumer was free to choose

according to his tastes and purchasing abilities. It was becoming clear that if buyers were free to choose and demand and suppliers free to supply, transactions proved beneficial to both. The nature of final demand was the result of competition among buyers and adequacy of supply was the result of competition among suppliers. An atmosphere of free competition among several buyers and several suppliers was seen to ensure an equilibrium condition (where supply equals demand) and welfare for both. The duty of the state was seen to be to ensure free competition by removing all interferences and influences on the free play of demand and supply.

The working of the new production system based on division of labour and of the forces of demand and supply was first brought out by Adam Smith, an Englishman in his epoch-making book 'The Wealth of Nations', published in 1776. He became the harbinger of the intellectual discipline called Economics. He also proclaimed that though buyers and sellers both promoted their individual self-interests the atmosphere of free competition ensured a sublimation of individual self-interest and thereby benefited society as a whole. He recommended that the state should allow the free play of the forces of demand and supply and should not interfere with or influence buyers and sellers. The free competition will reconcile self-interests of buyers and sellers automatically as if an 'invisible hand' is working behind the scene.

He further averred that even in the field of international trade free competition would benefit the parties concerned. This would be effected on the basis of comparative advantage. If England had a comparative advantage in the production of cotton textiles due to availability of cheap raw material, advanced techniques of production etc., England should concentrate in producing goods from cotton. If Portugal had a comparative advantage in the production of good quality wine, it should concentrate on wine production. If England and Portugal now decided to trade, it would be advantageous for both of them to exchange cotton goods for wine. Such trade would benefit buyers and suppliers from both countries. The state should not interfere in such trade by protecting certain industries or by imposing restrictive import and export duties.

Free competition and the Society

Though Adam Smith insisted that the state should not interfere in the free play of the forces of demand and supply, he was particular to point out that benefits from free competition would only result if the social atmosphere was correct. He was not prepared to compromise on the character of demand and supply. He insisted that both buyers and sellers should be well educated, having a high moral sense and convinced about their social responsibilities. Otherwise socially irresponsible people and people having criminal intent would dominate market and manipulate demand and supply to their own evil designs and defeat social welfare. Social and individual welfare would only result from free competition if the society had reached a particular moral and educational level, Adam Smith insisted.

Unfortunately economists who followed Adam Smith failed to notice the significance of this warning by A. Smith. No economic text book talks about the necessity of having a proper social atmosphere before the entry of free competition, into the market. Probably later economists were more inclined to treat economics as a science where market behaviour could be explained on the basis of mathematically designed models. They were not ready to consider the influence of ethics and morality on individual behaviour concerning the market. Later development of the 'Science of Economics' gave more importance to quantitative development than a qualitative one. Economics then gave importance to increase in production, the rate of growth of the economy, its size and coverage and the amount of wealth (capital and savings) generated in the economy. It did not concern itself with the equitable distribution of wealth in a society, the composition and character of commodities constituting total production and the impact such economic growth would have on social welfare and on the environment. In fact it assumed that distribution of wealth and income in a society would always be fair and just once free competition was established. On the other hand Adam Smith insisted that a fair and equitable society was a pre-condition to bring in free competition. Economics therefore, assumed ideal conditions and neglected to work to bring them about!

Such amoral approach was destined to have devastating

impact on social relations and on the way humans used nature and the environment.

Economic Realities after Adam Smith

The new system of production was firmly established as initially it catered for basic necessities of life which were made available cheaply and in good quantities. However, economists realised that production could not be increased beyond a limit if supply of certain resources remained finite. Increase in food supply would be constrained by availability of fertile land. Merely increasing the inputs of water, fertilizers and labour would not increase production of food beyond a limit. Eventually diminishing returns would set in. Each incremental input would result in diminishing returns. If population increased and food supply should not be increased due to fixed supply of fertile land, starvation and death would result and population growth would be checked. Mill, Malthus and Ricardo expressed concern about the inevitability of diminishing returns and its repercussions on population. Malthus even claimed that historical evidence showed population growing in geometrical proportions while food supply increasing only in arithmetical proportions. Food supply would always exercise a limiting influence on population.

Ricardo claimed that rise in production would lead to increasing exploitation of natural resources. The people and agencies who owned resources would then increase their prices (rent) resulting in a check on rising production. J. S. Mill agreed that technological progress would for a time arrest diminishing returns. Economic development could then become, he said, a race between diminishing returns and technological progress. For Karl Marx efforts of labour were the most important factor in production. The ownership of production must, according to him, be eventually taken over by labourers uniting and forcing capitalists to give up ownership. 'Expropriators (capitalists) would be expropriated' he said. However, explorations of the globe by enterprising navigators resulted in exciting discoveries of new land in America, Africa and Australia. The supply of fertile land was no longer limited and the availability of land for European population increased from 24 acres to 148 acres per head. Trade increased as relations were established with far

flung societies. Production increased as stocks of resources were discovered and political control established for their easy and cheap exploitation. New techniques were developed to reduce costs of production and cheaper labour was brought in from Africa and Asia. Even child and slave labour was used to keep down the costs of resources exploitation and production. The 19th Century brought unprecedented wealth and prosperity to European nations.

Market the Supreme Arbiter of Economic Relations

In such boom conditions everyone who wanted to work could be employed and unemployment was not even dreamt of. In fact labour shortage was feared. All problems of production had been successfully overcome.

If resources were privately owned and buyers were free to make their choice, claimed economists, market would be able to bring about an efficient allocation of resources with the help of available technology. If the supply of any resource became limited, its prices would rise, production would shift in such a way that the resource would not be required or a new production technique to replace that resource would be developed. This would reduce the demand for that resource forcing prices to fall. Market would therefore, bring about an equilibrium in demand and supply. All that was deemed necessary to bring about this equilibrium was private ownership of means of production and freedom of choice for the consumer. Once consumers had freedom of choice market would be able to bring about an equilibrium between demand and supply through the working of the price system (changes in prices of resources according to shifts in demands leading to efficient allocation of resources).

But is the criterion of freedom of choice of the consumer or consumer sovereignty, sufficient to bring about an allocation of resources which would satisfy everyone in the Society? Are private ownership of resources and available technology sufficient to reconcile demands of different buyers? If social welfare could be achieved on this basis, social equity could be achieved and the available supply of resources could be sufficient to satisfy everybody. There could have been no relative scarcity and no necessity of having a market to bring about an

equilibrium in an atmosphere of relative scarcity.

In the initial stages of Industrial Revolution when production system was directed to produce life's necessities, relative scarcity did not prevail and market was not required to allocate resources through working of the price system. The society did experience an atmosphere of relative abundance where everyone's demands were more or less satisfied.

But greater availability of resources from newly explored lands, the expansion of international trade, created a class of affluent traders, merchants and capitalists in European Society. With its distinctly higher purchasing power, this class began to influence the market. Production system began to shift gradually from production of basic necessities to production of 'intermediate' goods and luxuries demanded by the affluent and the powerful. Available resources began to be allocated more to 'intermediate and luxury goods' creating an atmosphere of relative scarcity. Resources could not be allocated to basic necessities. Market became the arbiter of economic relations as it began to allocate more resources where greater purchasing power was concentrated, i.e. dictating the distribution of wealth in the society. As greater resources were allocated to satisfy the demands of the rich denying resources to those lacking enough purchasing power, an economic divide between rich and poor began to widen.

Economics - A Dismal Science

The affluence of a section of European society was less due to efficient technology than to an incessant effort to reduce costs by all means. Monopoly buying of raw materials, ridiculously low prices enforced by political force (as in colonies in Asia and Africa), employment of child and slave labour and complete neglect of work environment, characterised industrial production. Factory towns resembled ghettos and black smoke from chimneys covered the English countryside. Consumer sovereignty, private ownership of resources and freedom of interference from the state, failed to bring about free competition where Adam Smith's 'invisible hand' would operate to promote social welfare. Economists who justified this production system and wealth creation were severely criticized by eminent thinkers, such as John Ruskin, Coleridge, Cobbett, Thomas Carlyle,

Charles Diknes, Hobson, Arnold, Morris etc. Ruskin branded the economic system as worship of greed and economics as a 'dismal science'. According to him the ideal human society should be a combination of Spartan simplicity and Athenian imagination and sensitivity. The individual goal should be moderate and not unlimited profits.

According to Ruskin and Hobson the individual profit motive should be moderated by a feeling of social responsibility and a desire to work for the good of society. They underlined Adam Smith's insistence on having a proper social atmosphere before free competition was launched. Advances in education, arts and science as well as in innovations and explorations failed to build up a society in Europe with high morals, strong sense of social responsibility and an urge to work for the betterment of human beings!

Machinery use and the Constraints it Brings

As more and more machinery was used in the production system, a supply and demand regime dictated by machines had to be followed. How much work a machine performs is determined by its minimum and maximum capacities. An entrepreneur has to ensure that the machinery is used at least to its minimum capacity. To get at least the minimum work from any machine the entrepreneur has to provide a machine an amount of energy and raw material. If these quantities are not provided, machines remain underutilised and returns from the machine are less than its cost. The entrepreneur has also to ensure that the minimum quantity produced is sold. If it could not, again the costs are higher than the returns. In a manufacturing business any entrepreneur thus has to face risk in production and sale.

It is of course more profitable for a manufacturer to utilize machinery to its maximum capacity. But demand may fail to match the maximum quantities produced. The result will be stocks of unsold goods lying with the manufacturer. Excess production is always a possibility wherever machinery is used. A manufacturer then has to use a variety of devices to entice customers.

Machines also have a definite life and their performance declines as their age advances. Machinery then has to be

replaced. The entrepreneur also has to keep stocks of raw material to feed machinery in adequate quantities. All this involves costs which a manufacturer tries to keep minimum as the risk of demand being inadequate is always present. To keep costs at their minimum the manufacturer then tries to shift the burden on to others. A factory owner will send the smoke into the atmosphere or waste flows into rivers to escape the costs of cleaning smoke and effluents by proper treatment. This will increase his margin of profit. He thus externalizes a part of his costs. Such costs which are borne by others or the society at large, are called externalities.

Technology has always aimed at increasing the capacity and/or speed of machines. Such production in mass quantities reduces the unit cost of production. The main task of the economic system then becomes marketing of the produce. The system has to see that buyers are induced to demand; new professions, vocations and services are pressed into the system so that buyers are constantly enticed to purchase. Technological progress has made such marketing inevitable. Advertisement, sale through hire purchase and credit cards are the means used to entice buyers.

The 'Roaring Twenties'

That increasing use of machinery meant over-production and unsold stocks has become apparent even before the 1st world war. During the war there was demand for everything and American industry increased its production capacity manifold to satisfy the orders from Europe. The sales of American industry continued to soar even after the war as European nations began to recover from the ravages of war. The 1st world war ended in 1918 but boom conditions in the US continued after 1920. As the sales roared during this period, the decade was called 'Roaring Twenties'.

But anticipations of a quick European recovery were belied, demand was less than supply and unsold stocks began to accumulate as the end of the decade approached. Unemployment in Europe was rising too resulting in failure of demand. Wage rates were reduced to counter the menace of unemployment which meant reduced purchasing power and further reduction in demand. This had repercussions on US

industry. As stocks remained unsold factories began to close down and unemployment in US started rising. Failure of demand was again the result. As factories closed down and business fell, a wave of depression began to engulf the economy. There was a great scarcity of capital as share market collapsed forcing many more businesses to shut down.

The Great Depression 1929 to 1933

By 1929 the depression became general and both US and European businesses suffered. Capital investment ceased as people had lost faith in the economy. Unemployment became rampant and public suffered due to lack of purchasing power. Government revenues fell also, forcing the government to reduce expenditure. That meant further reduction in purchasing power in the hands of the public. Failure of trade between US and Europe meant reduced transactions for many others. Thus the wave of depression that emerged in the west enveloped the whole world by 1933. It became evident that the Great Depression was the result of a general failure of demand, demand that failed to match the ever-increasing production capacity, brought about by advanced technology.

It became apparent that adequate demand is a *sine qua non* for an economy geared to increased production and growth in size. John Maynard Keynes who analysed the economic scenario asserted that the health of an economy depended on adequacy of demand. Technological advance would always result in increased production, he said; but if the demand could not match this increase, state must come forward and invest in worthwhile projects to generate employment and purchasing power in the hands of the general public. This would generate adequate demand to match the increase in production.

If wealth could be distributed throughout different sections of society, people need not experience paucity of purchasing power and demand need not fail. The science of Economics must expound how wealth in the society should be distributed so that supply and demand for goods balance each other. Economics however, assumed an ideal distribution of wealth in a society, leaving the market to determine allocation of resources on the basis of effective demand. In reality it meant demand of those who had adequate purchasing power. Economics never

emphasized the importance of creating a proper social atmosphere before consumer sovereignty and free competition were introduced. As purchasing power was unevenly distributed, failure of demand and depressions were persistent. But economists never attributed these to improper distribution of wealth in the society.

This system of production dominated by capital and investment (and hence called capitalistic) essentially depended on accumulation of capital through savings built-up through private ownership of the means of production and individual initiative and enterprise in trade. This inevitably resulted in wealth being concentrated in the hands of particular individuals or groups of individuals. Market was created essentially to cater to the demands of these and it worked through directing allocation of resources in particular fields and denying them to others, in effect creating a relative scarcity of resources.

In a way Keynes also dodged the real issue of bringing about a just distribution of wealth in a society by insisting that state should start investing on its own to arrest the failure of demand. This more or less maintained the 'market' allocation of resources, there was no radical change in the composition of supply and demand, and the 'relative scarcity' of resources continued. Keynes, in effect, did not challenge the supremacy of production over distribution.

The ideal of an economic system therefore, continued to be 'economic growth', i.e. quantitative growth in production. Keynes's analysis prompted 'Growth Economists' to declare that aggregate wants of human beings were infinite; if these wants were stimulated, there would be no failure of demand; all demands could be met as aggregate production could be made infinite through continuous advances in technology! Economic growth was therefore, necessary to satisfy infinite aggregate demands by making aggregate production infinite through technology!!

Such insistence on economic growth was not new to Economic Theory. All along it had profound impacts on Nature and Natural Systems. Let us now examine some of them.

The 'Explosion' of the Technological Man

The change brought about by the Industrial Revolution in

the European landscape was comparatively gradual compared to what happened in North America. There the technological man literally 'exploded' in 18th and 19th centuries and a continent where human beings lived harmoniously with nature for hundreds of years, was changed beyond all recognition in a period of 200 years. (18th to 20th century). In 1949 Fairfield Osborne wrote, "the story of our nation in the last century as regards the use of forests, grasslands, wildlife and water sources is the most violent and the most destructive of any written in the long history of civilization." Deforestation was rapid, especially in eastern states and only 7% of the whole US is now forested. In the east a wide variety of trees was selectively eliminated, species by species. But in the west pure stands of single species were cleared at once. The extensive central prairie was converted to agriculture. Grasslands were overgrazed and became prone to erosion. A lot of wildlife was willfully destroyed. The most numerous bird 'The Passenger Pigeon' was massacred till it became extinct. Numerous other birds such as Carolina Parakeet, Ivory billed woodpecker, Prairie Chicken, Eskimo Curlew, Whooping crane, the Great Auk and California Condor fell to excessive hunting till they either became extinct or came close to extinction, due also to habitat destruction. Great herds of American bison were slaughtered until now only a few remain in a reserve. Other mammals to suffer were the Wapiti, the Caribou, the Pronghorn and the Grizzly bear. "By the end of the 19th century the natural balance was upset everywhere, most representatives of the large fauna were nearly extinct, many habitats permanently spoiled and many species of the flora and small fauna defunct. North America affords one of the most tragic examples of the destruction of an entire natural complex under the brutal influence of so-called 'civilized' man."

South America suffered less as economic development there lagged behind till the second half of 20th century. As US influence and trade spread, Chinchilla, a rodent exploited for its fur, the Vicunas and Guanacos of the upper Andes are now all close to extinction. Islands in the Pacific and even Antarctic were not spared and fur seals, giant tortoises, flightless cormorants and the penguin, all from Galapagos island had vanished. Hawaiian islands have also suffered severely and of 70 native species of birds 27 have become extinct. Deforestation, hunting,

introduction of goats, rats and cats brought about this destruction.

Marsupials from Australia and New Zealand declined through modification of their habitat. Some mammals were hunted for their fur. Introduction of cats and rats brought about destruction of birds. In Africa large fauna began to be affected with the entry of the White Man. Lion disappeared from North Africa in the 19th Century. The heartbeest, the Barbary deer suffered the same fate in N. Africa. In Africa south of Sahara, habitats have already been modified before the white man's entry through bush fires and shifting cultivation. Destruction began in the 18th. century as Dutch and English settlers arrived. The blue-buck, the quagga (a zebra), the antelopes bontebok and blesbok, were eliminated. The elephant was massacred for ivory, the rhino for its horn and hippopotamus for its meat. Duikers were killed for their hides.

Madagascar and Mascarene islands had served as sanctuaries for primitive and highly specialized evolutionary lines. 24 of the 28 species of terrestrial animals disappeared on Mascarene islands. The flightless birds, the Dodo, the Dronte and the Solitaire have now become extinct. Lemurs were seriously threatened on Madagascar. These islands also suffered from introductions of mammals and birds such as the mink!

On the high seas whales have been suffering at the hands of man for several centuries. Most seals have also suffered from intensive hunting. Steller's sea cow, the sea otter, have been hunted for their skins. Rare plants have also suffered from horticulturists or collectors of herbaria.

At one time it appeared that total eradication of the wild flora and fauna was imminent until a few clear-sighted men became aware of the danger and began efforts to stem it.

War The Great Stimulant!

For the capitalistic system the era that ended with the Great Depression, may be captioned 'the non-interventionist era.' With John Maynard Keynes advocating state intervention to stimulate demand and the US under President Roosevelt accepting Keynes, the 'interventionist era' began. The 'New Deal' inaugurated by the President initiated a number of infrastructure development projects employing hundreds of

people and putting purchasing power in their hands. Workers in the private sector formed unions and demanded higher wages. But the real push that kick-started the US economy came when the second world war erupted. As before everything was in demand and even the government awarded big contracts to companies to provide weapons, arsenal and other goods to sustain the war effort. The US economy once again began the upward spiral, Keynes' theory was vindicated and state intervention to revive the economy became hence forward a standard practice.

After the war the US helped Europe to recover from the ravages of war by inaugurating the 'Marshall Plan'. Demand for American goods and services was as great as ever. America was also home to a number of inventions and discoveries during the war which established America's supremacy in scientific and technical fields. With demand for its goods and services ever increasing, America soon became the richest nation of the world.

Benefits of the Cold War!

With boom conditions continuing, workers' unions also pushed their demands. Industry, though agreeing to some of these, did not agree to workers' participation in management. Unions in effect were reduced to merely vociferous organs that demanded pay rises! Contractors and factory owners did not find it too difficult to concede workers' demands as another war, the cold war, came to their rescue. Both America and the USSR built up strategic alliances and began an arms race in conventional and non-conventional weapons and their delivery systems. Research in systems of communication, data recording and chemical products also received a boost. Private industry and business again received a variety of contracts from the Pentagon. As energy was subsidised, use of products based on petroleum and fossil fuels increased. Agricultural production increased with increased use of chemical fertilizers and insecticides. Intensive agriculture created large stocks of grains in Europe and the US. Management became more sophisticated with the introduction of new techniques and use of the computer. A well-heeled management cadre with fat pay packets began to emerge. Business could afford to engage them as boom conditions continued. They avoided intensive competition

through mergers and amalgamations. Giant corporations began to take shape with their diversified production interests.

Relative Scarcity and Throw-away Culture

In the 25 years after the end of 2nd World War the West, as US and its allies were known, experienced unprecedented growth, opulence and prosperity. In a capitalistic system growth even in geometrical proportions was said to be possible. People and their governments became so accustomed to a culture of exponential growth, that they refused to believe that it might end some day! Conditions of non-growth were beyond the perception of economists. Technology could perform all kinds of miracles, was the general belief. Markets were so over-flowing with a plethora of commodities and people seemed to have so much purchasing power that both supply and demand appeared to be infinite! But if everyone could get what she or he desired, the very existence of market would end as the necessity of want selection would end. For it was the market that was supposed to control allocation of resources by selecting certain wants and creating a relative scarcity of resources for wants that were not selected (because these were not backed by enough purchasing power).

In those boom conditions, it was the power of giant corporations which helped the market to retain conditions of relative scarcity. With their diverse production activities, it was not difficult for corporations to direct resources and labour to particular lines of production and to determine prices of various commodities. They could mobilize resources and determine prices because of the Throw Away culture that they introduced. Technological advance made possible mass production. Durability and prices of commodities were controlled in such a way as to induce consumers to throw away the older one and buy a new one! Constant changes in design and fashion, a variety of brands and media advertising encouraging a spirit of 'Keeping up with the Joneses' rooted this throw away culture. In a way relative scarcity was maintained by creating massive quantities of waste! Only if people could spend and consume, economy would grow, there would be full employment and prosperity for all, was the new credo.

Subsidy, the fundamental Right!

The plethora of goods made possible by advances in technology means production of commodities over and above the basic necessities of life, such as cold beverages, cosmetics, sweets and gadgets that save labour. As the saving habit was decried, investment in the production of such 'intermediate' goods could not come from regular savings, instead it came from loans. To reduce capital costs, corporations began to pressurise governments for grant of concessions in the form of tax cuts and subsidies. These were justified on the basis of job creation and reducing unemployment. Subsidies soon became a norm to prevent recession in the economy, to withstand international competition and to create employment. The lead of developed nations was soon copied by governments of developing nations where also industries and modern agriculture received subsidies in a variety of forms.

Take a Loan and Enjoy!

There was a constant rise in governmental expenditure due to the urgency of investing in technology development (new weapons, the space programme etc.) in defence installations, in carrying out national and international responsibilities etc. To this was added the expenditure on subsidies. Deficit financing by the government was justified on the ground that all this expenditure was necessary in national interest. If this was not sufficient the government had to enter national and international market to raise funds through selling interest-bearing bonds. This was justified on the ground of serving the economic interests of the nation, reducing unemployment etc. Soon indebtedness became the necessary condition for the working of industry, business and even the government. There were incentives for everyone to contract a debt. No longer was it fashionable to economise, to save for the old age in order then to live comfortably. The in-thing was to enjoy now and immediately all the goodies offered by mass production, even if it meant taking a loan. Economy would only grow and there would be employment for everyone, consumers were told, only when everyone decided to spend. Embark on a spending spree and enjoy to avoid recession in the economy and

unemployment, was the message delivered by the media. A new management science was developed to nurse this philosophy. New credit instruments like hire purchase, credit card, monthly instalments etc. were developed to entice the consumer. Consumer was made to mortgage his/her future for immediate enjoyment!

Let the Money Circulate!

The driving force behind economic growth was monetary circulation achieved through a complicated system of payment and receipts. Industries must contract a debt to keep production going; banks were to advance loans on the basis of deposits from individuals; if these were not adequate, banks themselves could get advances from financial institutions created by the state; the finances needed by the state could be raised by placing interest-bearing bonds on the market; which the banks would buy thereby providing funds to the state; the banks would have to secure their earnings from the interest payments by the state plus repayment of loans from business and industry. The banks would pay interest to depositors who in turn would be induced to take a bank loan by mortgaging their property. The thing was money must circulate and when everyone got a part of it, everyone would feel satisfied and the economy based on loans would spiral upward! The finance minister in his annual budget had to ensure that money was circulating alright!

Inflation Too is a Necessary Condition!

The quantity of money circulating in the economy might have a portion of it in the hands of everyone. But it did not really benefit the consumer, as prices were also on the rise. Business increased prices as they transferred the cost of loan repayment on to buyers. As prices increased, labour unions pressed for wage increase. The cost of higher wages was also transferred to consumers. The government also had to pay its employees higher salaries. As government expenditure increased, it also had to borrow. This meant higher circulation of money in the economy, i.e. inflation! Economists started advocating that the rise in prices could only be countered if supply of credit is adequate, i.e. a moderate dose of inflation was necessary to keep the economy functioning!!

• The higher circulation of money did put a portion of it in the hands of everyone but that did not mean narrowing of the gap between the rich and the poor. Actually it widened as new avenues were opened for the rich to get richer quickly. Investment in shares in the share market was the royal road to amass quick wealth. More and more money were diverted to the share market as the number of speculators increased. Some of them were highly successful and soon a new and growing class of millionaires began to emerge. Even common people started investing their savings in the share market.

The Unreal Wealth

Wealth that was created through circulation of money, could be called unreal or fictitious wealth as it could not be backed by quantities of precious metals or resources. An increased money supply in the economy does not wipe out the relative scarcity. No one can have enough purchasing power to purchase all the supply that was placed on the market. Wants are still selected on the basis of distribution of wealth in the society and resources are always scarce for the satisfaction of certain wants. As stocks remain unsold distant markets are located and transportation increased to send goods to distant locations. Cheaper transport requires subsidies from the government which means still large government borrowings.

In such an economy, total repayment of loans is hardly possible for anyone. New loans become necessary to wipe off earlier loans. As consumers become habituated to buy everything on credit, they are prone to spend more than what they can earn. The others have to work hard to make the two ends meet. As long as aggregate production is increasing and everyone gets some portion of it, this system based on paper money will go on working. Developed nations have phenomenally increased the consumption of their populations through facilitating transport and communications, technology transfer and expansion of the service sector. Computer technology has vastly improved the flow of information and has also given rise to a well-healed class of technocrats in developing nations. Consumption levels of a class of people in developing countries have also gone up significantly. This voluminous flow of information across the world has generated confidence in the

supremacy of technology which is seen to be capable of overcoming any resource crunch.

Economic growth based on advances in technology is being considered as cure-all for all possible ills. The rate of growth is to be increased and to be maintained at a higher level, through offering attractive terms to foreign investors, increasing flows of credit to certain sectors, directing resources flows to satisfying particular wants, justifying relative scarcity and directing human resources to satisfying wants selected by market forces by creating relative scarcity. In the next twenty years, it is being confidently predicted that India will enjoy the prosperity that was once enjoyed by developed nations in post IInd world war era, and India would soon attain the status of a global power.

Today's Burning Problems

Is such confidence justified? Is economic growth likely to go on forever? or will it be constrained by certain factors? Is technological advance likely always to offer timely solutions? What does technological advance exactly mean? Let us try to find answers to these questions.

Adam Smith had claimed that free competition would operate in such a way as to achieve social welfare through sublimating individual self-interests only if the concerned society could achieve a high level of moral and social responsibility. Economic development and growth have not helped in the last 300 years in creating such an atmosphere in any society. The general consequences today is that in the complicated system of production and distribution evolved through technical progress, it is impossible to bring in free competition. Bringing in free competition means buyers and sellers have perfect knowledge of all present and future transactions, that is they are also aware of present prices and changes expected in them in near future; that they are also aware of the consequences of today's decisions and how they will affect decisions of buyers and suppliers in future, and that they can also comprehend what miracles technical progress may bring in future and what will be their consequences! As no society is capable of such extraordinary knowledge, free competition remain a Utopian dream.

Nature and Economy

Nature is a system that works through certain processes. In the course of evolution nature is manifested through different eco-systems such as atmosphere, the sea, land, vegetation, etc. which are repositories of different forms and shapes of matter galvanised through energy. The source of energy is the Sun. Different components of nature receive and utilise this energy and dissipate it as heat. Evolution has created certain mechanisms through which the circulation of energy and its utilization are achieved. These mechanisms are essential for the survival of all living organisms including human beings. They provide vital services to living beings. Some of these mechanisms are: soil, forest, flowing water, the sea, the atmosphere etc.

The primitive man was totally dependent on nature's mechanisms as all the wherewithals of his life came from nature. Like any other animal he/she was using the products of solar energy. When he/she started making use of different things in nature to produce other useful things, the usable things in nature became his/her resources. Things that are outside economic transactions enter into economic transactions in a production system and again go out as waste out of economic transactions after they are used. But certain mechanisms in nature remain outside economic transactions and are still used by human beings, e.g. atmosphere, the sea. Organisms in nature are able to convert waste into usable materials. Soil if used for farming may get exhausted but its fertility will return if kept fallow. Air and water have self-cleansing qualities. Many usable things in nature and natural systems have a capacity to regenerate or renew themselves. If things are used according to their regenerative capacities, one can use them over and over again.

After use matter goes into a state of entropy or disorganisation. Entropy may also be created in the environment where waste is deposited. Agents like decomposers are available in nature to recycle nutrients present in the waste. In this sense nothing is wasted in nature as the released nutrients were reused for regeneration. Human beings should create only as much waste as can be handled by decomposers.

Who is to Bear the Cost? Nature or People?

If resources are used according to their regenerative and recycling capacities, the cost of economic transactions will be reduced. A large part of work will be processed by natural agents who charge nothing. Today resources are used on such a scale and in such quantities that nature can neither regenerate nor recycle. Technology may help people to accomplish these processes but only at a price. As the scale of production increases, this cost also increases. Avoiding this cost means allowing the environment to languish in disorganisation, i.e. creating pollution! This cost goes up as consumption increases and as technology is used to perform tasks otherwise performed by nature free of charge. Technology used in this way becomes expensive!

Economic growth, which means increase in production and consumption and consequent increase in waste, will involve higher and higher costs as technology replaces nature in regeneration and recycling processes, to avoid pollution. Should we allow such costly growth to continue or should we restrict it within the regenerative and reabsorptive capacities of nature by maintaining eco-systems and nature's mechanisms in a healthy state?

The Threshold Effects

Human beings use nature in two ways: they extract natural resources from land, sea, forest etc. and they use nature's systems free of charge. People require oxygen for breathing, they do not manufacture it but use it as provided by nature in the atmosphere. Soil is required for agriculture. It is not manufactured by decomposing rocks but is used as given. We use plants' natural capacity to produce food through photosynthesis. Decomposing services offered by decomposers are also used freely by us.

But all these mechanisms will degenerate if overused by human beings. All these mechanisms have a threshold of tolerance. Their efficiency decreases if their use is stretched beyond this threshold. They can tolerate strain only upto a point. Unexpected consequences may result if these are stretched beyond their thresholds. When human population was low,

these thresholds were rarely exceeded. Their life cycles continued unperturbed. Now thresholds have already been crossed in many instances, disrupting the working of eco-systems and their rhythm and disturbing their cycles. Scientists are not at all sure about the nature of the consequences.

Indiscriminate conversion of all kinds of eco-systems for agriculture, disruption of the natural flows of rivers and disturbing thereby their physical and biological equilibria, increasing carbon dioxide in the atmosphere are the most common instances of overuse of nature's systems by human beings. How these will affect temperature, humidity and rainfall? How will the natural erosional and depositional processes be affected? What will be the effect of such drastic changes on the lives of several non-human beings who also utilize these mechanisms? In turn how future human life would be affected? Scientists are unable to predict with any degree of accuracy!

Evolution also brings about changes. But this change is far slower than the one effected by human beings. Eco-systems are unable to face this rapidity of change brought by human beings. Most eco-systems lose their productive capacity immediately such as soil under intensive agriculture or production of sea organisms due to destruction of mangroves. Destruction of forests affects the quantity of natural food as area under photosynthesis is reduced. It will also affect hydrology. Destruction of habitats may lead to changes in the variety and composition of insects and this may lead to the emergence and spread of new diseases. Large scale death of phytoplankton in the sea encourages algal bloom which remains a potent cause of many infections. Loss of temperate forests reduced the populations of 35 species of insectivorous birds inducing pests to erupt and affect several of remaining trees. Insecticides introduced by human beings have actually created more pests than they have destroyed!

Human beings then try to overcome such consequences by using technology. Technology is being increasingly used to enable us to survive in a degraded environment. As technology is used as a substitute for nature's services, the cost of economic transactions goes up.

Does 'Growth' mean Increased Energy use?

The prosperity enjoyed by America and Europe in the fifties and sixties of 20th century began to appear empty, hollow and weak for many people. It became apparent that nature everywhere was victimised in the cause of economic growth. In 1962 Rachel Carson's 'Silent Spring' was published. It detailed the adverse effects on birds and other fauna and on human health of increasing use of pesticides in farms. It vividly brought out the destruction of nature for the cause of increased production. Many manufacturers became the target of public ire. Companies sued the author for defamation but courts, after examining all the evidence, vindicated her stand. The book became extremely popular and effectively sparked off 'Save the Environment' movement in USA.

In Europe eminent thinkers and scientists came together to produce a report called 'Limits to Growth'. It also laid bare how Europe was sacrificing nature and natural resources for economic growth. It was literally growth at all costs! If the then scale of resource exploitation continued, they argued, a severe crunch would appear by the year 2000. They also underlined the dangers of increasing pollution.

These studies also highlighted the fact that economic growth was due mainly to the availability of cheap energy. Developed nations were able to get oil from the Middle East at ridiculously low prices. Even during the world wars, petrol was sold at less than a rupee per gallon! With such pricing products based on petroleum multiplied fast until 70 p.c. of the market was captured by these. Dr. Narinder Singh in Cambridge, England, published his thesis 'Economics and the Crisis of Ecology' in 1976. He showed that most of the products available in the market were decidedly poisonous and were spreading contamination of water and soil. Pollution from industrial and commercial growth was the main cause of higher incidence of cancer, it was argued. The growing pressure from the Environmental Lobby in America compelled the US Government to establish the 'Environmental Protection Agency' with wide powers to check all sorts of pollution.

In 1973-74 oil producing countries of the world joined hands and substantially raised the price of oil. There was an immediate

crisis in the production system and European economies were severely affected. Recession was in the offing, US industry was also affected and once again public faith in the economy was shaken.

As environment protection movement gained momentum, UNO was forced to take action. The UNO invited all heads of states to a conference in Stockholm, Sweden, to discuss the environmental crisis and suggest solutions. Debate on pollution and economic development dominated the meet. India's prime minister Smt. Indira Gandhi argued that poverty was the biggest polluter and pleaded that developed nations must help the developing world in eradicating poverty!

As the debate on pollution and economic growth became more general the role of energy in economic development and what effects conversion of matter by applying energy, produced in the economy, were examined in detail and from different angles. Let us now look into these issues.

Energy – A Double-edged Sword

For Planet Earth, the source of all energy is the Sun. Stocks of matter are available on the planet in various forms and shapes. Both, the flow of energy from the Sun and stocks of matter are finite, as neither of these can be increased. Energy is required to produce goods from stocks of matter, it may also be required when goods are processed or being used and to decompose the waste so created, energy is used also.

Planet earth is a closed eco-system as all matter is utilised and recycled here through the application of energy and nothing goes out of it. All living organisms are open eco-systems as waste is thrown out of them after energy and matter are consumed and used. The economic system created by human beings is a part of the earth's system as energy and matter are used. Economic production is also a part of the total eco-system productivity of planet earth. In this sense the waste created through production and consumption should also be recycled and nutrients and other material released from decomposition used for regeneration and restoration of eco-systems!

In the process of evolution, the use of matter and energy has increased and become diversified over the millennia. This use increased substantially after the evolution of photosynthesis. As

surplus food was produced a variety of organisms evolved, habitats and niches were formed to accommodate them. As the food surplus was by no means unlimited, the development of life on this planet was qualitative and not quantitative. Life diversified but evolved in such a way that no single life form could dominate the earth indefinitely. Different forms such as invertebrates, fish and amphibians, reptiles and mammals dominated life in different eras. Human being is the dominant form of this era. They are trying increasingly to direct the existing flows of matter and energy towards themselves and are also using energy from fossil fuels. The rise in the share of human beings within world's total productivity is therefore, quantitative and not qualitative. Forty percent of all the terrestrial production is being utilised by human beings forcing the rest of the living organisms to survive on the remaining 60 p.c. Consumption is being increased not through utilising diversity but by reducing it to uniformity. At the same time energy has been used to produce chemicals and other products which the existing mechanisms in nature are unable to break down. On the one hand diversity is being reduced and on the other waste is accumulating. As all this goes against the evolutionary trend, the growth is not sustainable and human domination of world will be short-lived. This is the argument put forward by some scientists.

The Eternal Laws of Physics

Certain immutable, eternal laws governing the universe also tell us that such quantitative growth cannot be sustained. Two basic laws of thermodynamics are: 1) energy and matter can neither be created nor can it be destroyed and 2) total conversion of matter by applying energy is not possible. Both energy and matter go into forms of entropy to a certain extent. Part of energy escapes as heat and part of matter comes out as waste in any transformation. At each step in the process of transformation some energy and matter go into a state of entropy. Increase in production involves numerous steps in which heat and waste increase and they even create entropy in surroundings where they are deposited. If heat and waste are created beyond the absorption capacity of the surroundings, pollution will be the result.

From Entropy to Regeneration

In any system of production creation of entropy is a cost, heat as lost energy is a cost and waste as lost matter is a cost. The whole system of nature can be conceived as an effort to reduce entropy inherent in energy and matter. As evolution shaped matter and energy into living forms and organised them into mechanisms, costs in terms of entropy had to be incurred, entropy created in the surroundings which over geological time could be reduced. When something dies or loses its form, not everything is recycled, part of it remaining in the surroundings to be gradually converted to reusable energy and matter, e.g. the formation of fossil fuels in the bowels of the earth. Evolution proceeds in such a way as to use energy and matter in ways where costs are kept to the minimum. Life forms which require both matter and energy in great quantities and over a shorter time are though numerous in population have tiny bodies and a short lifespan; these are mostly insects, bacteria etc. whose rates of metabolism are high. On the other hand life forms using matter and energy in concentrated form, have slower rate of metabolism, longer life and also smaller populations. Most of the higher plants and animals constitute this category. Evolution have perfected life forms in such a way as to make their shapes, populations and life span proportional to their requirements of matter and energy and to the rate of metabolism. In water and land energy and matter are distributed through habitats and niches in such a way as to keep entropy costs to the minimum and still support a huge diversity of life. Trees that require large quantities of water grow only in particular climates. When water is scarce, grasses and not trees is the common life form. For deserts only specially adapted plants and animals can survive.

In nature every life form has to struggle to keep down the entropy. If it does not get enough energy to keep its body away from disintegration, the life form inevitably proceeds towards death or disintegration. Every life form has to compete to get enough energy for survival. Today human beings have outcompeted every other life form by capturing a large part of energy and matter flows. Such diversion and consequent conversion of matter by applying energy have resulted in entropy, enormous quantities of energy escaping as heat and of

matter thrown out as waste. These costs have increasingly to be incorporated into the costs of production, which increases prices. If they are not incorporated, increased pollution is the result. Every human society has been caught either in the spiral of increasing costs, i.e. higher and higher costs of living as in developed nations or increasing pollution as in developing nations.

The eternal laws of physics dictate that if all entropy created (of energy and matter and of the surroundings) is accounted for, and everything recycled, input balances output, surpluses are temporary and small and net productivity is zero as in an ecosystem of mature forest. Large surpluses are a result of imbalance in the system, where some costs are borne by others and are not accounted for and resulting waste allowed to create pollution. Surplus, i.e. profits, in a system of production can result because some sections of society are made to bear costs of externalities and pollution. Profits mean robbing Peter to Pay Paul. 'In this sense, they are completely unnatural. A production system which hankers after continuous growth of profits will always create imbalances, deprivation for certain sections of society and greater pollution. It will also make cost of production greater than value and the system will require constant subsidies which ultimately means a higher burden on nature or some sections of society. Moderate profits, which are invested in social capital to promote equity in society and lessen the sense of deprivation of certain sections of society, should be the goal as Ruskin had wisely advised!

Such compulsions imposed by immutable laws governing energy and matter were conveniently forgotten as advances in technology promised high rewards. As greater and still greater production became technologically possible, greater investment was diverted towards locating additional sources of energy and minerals, in refining marketing techniques, in improving transport and communications and in erecting other infrastructure. As costs continued to rise, developed nations began shifting their industries, especially pollutive industries, to developing nations, where labour and other costs were low!

Developing nations as also communist nations had adopted a capitalistic production structure. Keeping production costs low and avoiding pollution were the problems their economies faced

also. Developing nations tried to keep costs of energy and raw materials low by allowing industries to exploit their own resources at greatly subsidised prices and depriving people of the use of these resources. The centrally planned economies of communist nations monopolised control over energy and materials and directed their flows to particular uses. Costs could be kept low by controlling prices and restricting consumption. Rising pollution was largely ignored and implementation of pollution control laws became lax.

A Benign, Conscientious Predator!

The apex predator, the human being, is a two-faced creature. The familiar, widely seen face is of predator par excellence, out to kill everyone and everything in pursuit of self-interest; the other face, persistent but rarely seen, is of a benign, all-caring, a Steward duty bound to save all God's creations! The history of nature conservation is therefore, as old as human beings themselves.

In India Vedas had eulogised nature as the early Aryans perceived it. As cattle-herders and nomads, they probably showed little interest in preserving natural habitats. When Aryans entered India, settled down to form kingdoms, they must have realized the connection between the health of nature and natural resources and the welfare of the state. The later Vedas and the Upanishadas contain references to forces of nature like the hydrological cycle and the energy derived from the Sun and their importance to life on earth. Emperor Ashoka was however, the first to record laws and dictates about management and care of forests and animals living there. Benign treatment of animals continued in more or less intensity, throughout India, till the country suffered from invasions. Invaders like the Muslims and later the Europeans took delight in mass hunting of animals and birds, especially the larger carnivora, and a number of other animals like the elephant and the rhino were victimised by the trade in their body parts. The number of animals and birds completely eliminated from India however remained small till little before the Independence, when a system of national parks and sanctuaries was set up to conserve nature.

In Europe Greeks showed extraordinary interest in natural phenomena and virtually established the science of natural

history. The Roman Empire however, was more predatory than conservation-minded and such conditions continued till Mediaeval times when certain kings and princes enforced laws to protect game animals and forests. In China Mongal emperor Kublai Khan prohibited hunting of birds and mammals during the harvesting season.

In modern times the first natural reserve was established in France by a group of painters in 1853 and was sanctioned by a royal decree in 1861. The concept of large reserves was born in the US when the Congress ceded the valley of Yosemite and Mariposa Grove to the State of California to establish a natural reserve and protect Sequoias. The first National Park was established at Yellowstone in USA on 1st March 1872. The idea of creating nature reserves such as national parks and sanctuaries has now been taken up by almost all nations and relevant laws have been enacted to protect flora and fauna.

As experience of handling natural reserves was gained, it was realized that mere elimination of human disturbance might not lead to conservation of flora and fauna. Isolated small reserves were found to be always at the mercy of surrounding land use from where pernicious factors might affect them. It was also found that large-size reserves were more viable than many small ones scattered all over. A system of corridors also was thought necessary to provide interlinking of reserves, so that animal movements were facilitated.

Necessities of economic development however, many times conflicted with the maintenance and viability of these reserves, especially in developing countries. Their boundaries had to be redrawn, chunks of habitats had to be sacrificed for particular development projects endangering certain species of flora and fauna. It was also claimed that reserves were created on lands that for generations supported tribals and other local communities and that their eviction from those would disrupt their livelihoods and their culture. This dilemma was posed as people versus wildlife conflict and as yet no satisfactory solution that would protect the interests of both has so far been worked out, especially in a country like India. Pressures of population and economic development render therefore, the future of these protected areas at best tenuous, at worst bleak and dismal.

The IT Revolution

The relentless march of technology and economic development continued through 1980s and 1990s. The computer so far was an instrument mainly to record and store vast amounts of information and to carry out intricate calculations not possible for individuals. With advances in space technology and launching of data-gathering satellites in the space, the era of computer connectivity began. Internet made possible instant communications over unimaginable distances facilitating give and takes of vast quantities of information including photographic images. Markets for certain commodities suddenly became worldwide, capital movements became dangerously easy and flights of capital destabilized certain economies. With fossil fuel use still subsidised by most governments, intercontinental transport was not expensive and big corporations began looking for distant sources of raw materials and developing far flung markets. For these big market players globalization became an essentiality as tariff and other barriers could have impeded free movement of resources and goods, increased costs and reduced profits. So was propelled the credo of globalization and governments and people enticed to the alluring prospect of limitless availability of goods and commodities with the development of a global market.

Time had arrived for nature to become just one sector of human economy like agriculture and industry as was believed by growth economists of post 2nd world war days!

The nature conservation movement which began with the publication of Rachel Carson's 'The Silent Spring' and prospered in the post oil-price rise era (1973-74) suffered during the administrations of Thatcher and Reagan in the U.K. and the U.S. respectively. In the name of providing an impetus to their sagging economies and more jobs to people, they weakened administrative agencies like EPA, slashed funds for education and health and provided tax cuts and subsidies to the corporate sector. The UN however came forward with fresh initiatives adopting World Charter for Nature in 1982 and then appointed a high-level commission under the chairperson Mrs. Brundtland, Prime Minister of Norway, to go into the question of development versus environment debate. The Commission, in

their report, emphasized the need for sustainable development meaning thereby development which while conceding the needs and aspirations of the present generation, does not compromise the needs and aspirations of future generations. The Commission exhorted developed nations to cut down consumption and give more aid to developing nations enabling their citizens to cover their basic needs and requirements of education and health. It implied that unless a basic level of development was reached, nature conservation would be futile. But it also stated that environment should be considered in determining all policies and that it should not be sacrificed in the name of development. It enjoined each nation to evolve its own environmental code consistent with its geographical position and culture.

For environmental conservation these cardinal principles were enunciated :

1. The Polluter Pays Principle : A polluter cannot externalize the costs of pollution. He must cover the cost of abatement of pollution so that others do not suffer from it. The onus of proving that his actions are adequate is his.
2. The Precautionary Principle : National policy makers should keep vigil and assess if their policies are affecting the environment and to what extent. They must take every precaution to avoid damaging environment by suitably modifying policies and rejecting damaging options.
3. Sufferers of environmental pollution should be adequately compensated and damaged eco-systems should be restored.

The UN General Assembly's initiative in constituting the Bruntland Commission was followed up by other organisations. The United Nations Environmental Programme in 1989 issued a World Charter on Environment which demanded conservation and judicious use of natural resources and eco-system utilisation in ways that would not damage their stability and resilience. Even earlier, i.e. in 1980, the International Union for Conservation of Nature had published the World Conservation Strategy, appealing every nation to draft its own national conservation strategy. The UN strategy had also cautiously advocated reduction in resource use and consumption for the developed nations.

These appeals hardly produced any tangible results largely

because the US continued to ignore and Canada, Japan, Australia more or less followed US. The European union enforced strict pollution control and overall energy use was reduced. The developing nations under the UN banner continued to press for international cooperation in nature conservation and aid to eradicate poverty. The result was another worldwide conference convened by the UN in 1992 at Rio de Janaro. The heads of states who gathered there adopted Agenda 21, an environmental policy blue print for the 21st century. The Conference however, carefully noted the non-compliance of member states in carrying out provisions of various agreements and resolutions passed since 1972. In this respect the negative role played by the US was highlighted. Adequate international co-operation was not forthcoming to check the rise in global temperature, the hole in the ozone layer and increasing marine pollution, it was noted. Closing years of the 20th century brought out the fact that humanity's efforts to save the planet were far from adequate!

The Concept of Sustainable Development

Economists of various hues either supported or criticised the concept of Sustainable Development. Hartwick and Solow differentiated between sustainable economic development and sustainable environmental development. Consumer sovereignty and an efficient price mechanism were thought to be necessary for the former. To achieve economic sustainability, the prices of non-renewable resources had to increase every year in proportion to the prevailing rate of interest, for their efficient allocation and the rent accruing from their use must be invested in production and regeneration of renewable resources. This theory assumed perfect substitutability between natural and man-made capital. The prices of resources must cover the cost of restoring the destruction and degradation of eco-systems.

The above conditions were thought to be insufficient for achieving sustainable environmental development. Several other pre-conditions had to be fulfilled. They are :

1. Eco-system needs are more important than consumer sovereignty.
2. No perfect substitutability exists between natural and man-made capital.
3. The use of natural resources should be within the bounds of

their natural regeneration.

4. The production of waste should not exceed the assimilative capacity of natural systems.
5. Biodiversity has to be maintained and enhanced for future generations' wise use.
6. The notion that development and environmental protection cannot go together, should be abandoned and all policies must include considerations of environmental protection.
7. Natural systems should be allowed to work according to their capacities and man-made capital should not be substituted for them.
8. Substitutes should be developed for non-renewable resources and use of renewable resources should only be increased.

What Makes Sustainability Unsustainable?

The ushering of the new century failed to inaugurate a new era in either economic or environmental governance. Sustainability or sustainable development in both, its economic or environmental forms, continued to elude humanity as their imperatives were far too constricting for growth economists and champions of the market system. If natural systems and biodiversity are to be conserved and looked after, these would have to be properly priced in the market. But economic growth so far had prospered by keeping down the prices of natural resources (through state subsidies and political or monopoly control) and not valuing at all nature's services. Also economic growth had to rely more and more on stimulating the demands of the consumers. It was therefore, unthinkable for proponents of growth to accept that needs of natural systems were superior to consumer sovereignty!

Today's preponderance of the market system is being maintained by 1) investing in goods and services which save or substitute for human labour, 2) investing in trying to discover new sources of non-renewable resources and 3) by commercializing education and directing it to satisfy needs of the market rather than those of social welfare. Instead to direct investment in natural capital, in making nature's systems and services more durable and efficient and in recycling, repairing, restoring, waste and wasted nature, would be unthinkable for

supporters of the market system. For the system survives on waste creation and throw-away culture! The necessity of developing an alternative educational system which will give due recognition to achieve social welfare and make restoration and conservation of nature viable and remunerative, was not even visualised. Lastly if today's have-nots become politically strong, economy would be directed towards achieving more equitable distribution rather than achieving higher and higher production. This would have meant an end to the present market system which increases production by maintaining relative scarcities and ignoring just distribution of wealth! Sustainable development therefore, remains an anathema for growth economists and proponents of the market system.

They therefore, convinced themselves that environment and natural systems would be protected if the following could be achieved :

1. Internalizing the externalities and adjusting the production costs accordingly;
2. Developing controls and standards to check and minimise pollution of air and water;
3. Making cost-benefit analysis and/or environmental impact assessment compulsory for projects that involve investment beyond a minimum;
4. Creating protected areas such as national parks and sanctuaries for nature conservation;
5. Creating administrative agencies to implement and enforce above provisions and
6. Instituting tradeable permits which will goad firms to minimise pollution and encourage use of energy saving technologies.

Such provisions, controls, standards and administrative requirements have become 'legal tender' in almost all the developed and developing nations today (2006). Once again, humanity therefore, succeeded in circumventing and dodging the real issues of sustainable development and equitable distribution of wealth.

It was apparent at one time (before the Thatcher-Reagan era) that even the honest enforcement of the above provisions had not only reduced pollution but inequality of wealth also. The champions of market system could not tolerate these trends as it

meant declining importance of the market. They therefore, prevailed upon their governments to adopt policies that would bolster production in the name of job creation. This production subsidy became possible through reduction in expenditures on education, health and other social welfare measures! Nature conservation and pollution control also suffered through reduced budgetary allocations and lax enforcement of rules and regulations. Relative scarcity was maintained through war expenditure, development of weapons systems and investment in related fields. This trend continues today!

In developing nations the supremacy of the market system was maintained by persuading the haves and the powerful to view environment and development as alternatives, by watering down provisions in environmental laws and regulations, by encouraging lax enforcement and by encouraging an educational system geared exclusively to technology and the market. In this respect it is common knowledge that the role of bribery and graft is by no means insignificant!

The result is devastation of nature and natural systems and scarcity of natural resources tending to be absolute rather than relative!!

What then lies in future? Are there any alternative systems of production and distribution, of energy and material use, or in general, of reversing the present trends! Or is nature already doomed?

An Alternative Economy

In the last over 300 years, the economy that has been produced and practised by the civilised humanity, is one which emphasizes production and not distribution of wealth. An alternative economy should emphasize production as well as equitable distribution of wealth in a society. What could be the imperatives of such an economy?

A decentralised system of production focusing on utilization of local resources to satisfy local needs, may be the prime necessity. Such decentralised transactions is the surest way to check accumulation of excessive wealth by individuals. Democratic governance and free competition in the market cannot bring this about. But this imperative may not be sufficient to promote nature conservation. Nature conservation can be

promoted through :

1. a production system which produces goods necessary from the economic as well as environmental point of view;
2. a production system which uses simple techniques which minimize use of energy and materials;
3. a production system which values natural resources more than human labour;
4. a production system which organizes agriculture and industry in such a way as to mimic natural processes;
5. a production system which does not aim at simplifying natural processes and redirecting flows of energy and materials to human beings but which aims at utilizing available biodiversity and food chains and food webs to obtain food and other necessities for human beings;
6. and a production system not based on continuously increasing human wants but which aims at development of human values while satisfying human desires.

In this sense sustainable development is not a mechanism to be set up to organise production and distribution, but is a system of economic and social values. SD can only be attained in a society of individuals with adequate level of education and holding high moral values and having a very high sense of social responsibility as visualised by Adam Smith.

Once Again Circumvent Ethics and Morals

One wonders whether this is possible in today's human society where science is amoral, where technology is held in the highest esteem and where individual and social behaviour tend to be analysed using mathematical modelling. Once again we find human societies circumventing moral and ethical principles while trying to economise use of energy and materials. A number of such experiments are being promoted in developed and some developing nations.

3 M Corporation in the US reduced its energy bills by over \$50 million by inviting suggestions from its employees. In Denmark a power company provides other industries energy in the form of escaped steam which economizes oil use. Petrol-saving hybrid cars are becoming popular in USA. New enterprises based on recycling, repair, refabrication now number 73000 in the US and employ about half a million people. In

business schools 'Reverse Logistics' has been introduced as a subject which aims to recover useful goods from the waste. Waste is being incinerated not by using coal or oil but sound waves! In building construction use of local materials is increasing, new techniques of insulation from heat or cold are being used saving electricity, coal and oil, vermiculture, organic farming are replacing use of fertilizers and insecticides based on petroleum, agricultural waste is being utilised to produce low cost coal through fermentation etc.

In America people are now speaking of natural capitalism and an economy based on restorative efforts in various directions. Over 2000 local communities have been organised in Europe and America where self-help and human labour are employed to satisfy human wants using local resources. Some of them have also established their own currencies which basically exchange labour units. In Brazil a co-operative movement having a membership of 1,50,000 families is now spread in 23 states. The movement co-operatively manages agricultural production, social services, credit supply, agribusiness etc. They have their own system of education used in 1000 municipal and government schools, employing 2800 teachers and providing education to 75000 children. The movement has its own supply sources in which organic farming and soft engineering techniques are used. They have also their own water supply system based on small and large dams, artesian wells, dug wells and canals. They also have animal husbandry, dairying and poultry wings. As such this co-operative movement has been successful in establishing an alternative economy in Brazil.

In 2002 China passed a law to bring into reality an economy based on circular movement of energy and materials. On this basis 20 industries have been identified and reorganised to use environmentally sound clean technologies. Ten thousand workers have been specially trained for this.

The Global spread of such efforts is still limited. They are bound to have a beneficial effect on nature conservation if they expand their reach.

How to Sabotage an Alternative Economy

While the above developments were taking place, the supporters of growth and market system were not idle. An all-

out effort was made to unify and standardise the production system through large corporations bent upon capturing global sources of raw materials and minerals and expand the reach of the market. Negotiations were held through the mechanism of the General Agreement on Trade and Transport (GATT) in which the official US delegation was assisted by representatives of large corporations such as Nestle, Pepsico, Philip-Morris, Mossanto, Dupont etc. The rules and regulations formulated by the GATT made it difficult to provide adequate protection to such threatened marine species as Tuna and Dolphin. Following these rules rendered implementation of pollution control regulations difficult. The GATT gives more importance to reducing costs of production than exercising pollution control.

Taiwan and South Korea had enacted laws to control and reduce the use of tobacco. The GATT forced these governments to repeal these laws. This benefited US tobacco manufacturers but were harmful to social relations in these countries as addiction to tobacco increased! If a country limits exports of natural resources to conserve them it becomes liable to pay fine for infringement of GATT rules!

Since 2004 GATT rules and regulations have the result of making the implementation of pollution control difficult and making enforcement agencies non-functional. Conservation of rare plants and animals and preservation of stocks of natural resources are also being rendered difficult. The consequences are rise in pollution levels and economic inequity in many countries!

The Multilateral Agreement an Investment being promoted by developed nations will bestow exclusive rights to large corporations in developing countries. It will then become very easy for them to expand their operations. This agreement will limit the authority of respective national governments to control their economies and direct their operation in socially beneficial ways. This will further open up many fields for multinational corporations!

These concerted efforts by the developed nations to expand the sphere of influence of a technology and production based economy are bound to have profound impacts on nature and nature conservation, especially in the developing world. The proponents of market will always ensure that the nature of initiatives to bring about an alternative economy and to conserve

biodiversity remain superficial and would never lead to basic changes in the economy. The struggle to bring about democratization in decision making in the production process and promote an equitable distribution of wealth in society is going to be hard and long-drawn out!

At the end one may indicate here a set of criteria which should help people or groups to organise initiatives that will lead to changes in the structure of the economy and help thereby conservation of nature. These criteria are:

1. Initiatives that put pressure on the government to abolish subsidies to minerals and fossil fuel extraction and pollution industries based on that.
2. Adoption of a landscape approach in planning. This will involve organizing human settlements, public amenities, production centres in consonance with the existing structure of eco systems and working of natural processes.
3. Efforts that promote a production system based on local biodiversity and availability of natural resources instead of on export needs. This should lead to self-reliance and care of natural resources.
4. Efforts that make economic activities respect ecological boundaries.
5. Efforts that reduce all kinds of transport in carrying out economic activities, thus reducing energy and materials use and pollution.
6. Efforts that enhance the environmental capabilities of urban areas. These include use of wind and solar energy, energy from waste, recycling and re-use, rainwater harvesting, terrace vegetable gardens etc.
7. Efforts to make producers responsible for the total life-cycle of their products. They should preferably be able to utilise waste to regenerate useful products.
8. Efforts that aim to replace carbon-based economy by a carbohydrate-based economy.
9. Efforts to promote a social system that will continuously assess the eco-system needs and base the production-system and changes therein to conform to these needs.
10. Lastly efforts to promote a social system that will replace the present system of wages and salaries by a family social income which values today's unpaid work performed by

women and men at home and/or for the society. The society thus honours women's unpaid work that helps maintain family relations and voluntary work of social workers.

All these efforts will indirectly help nature conservation and nature conservationists will do well to wholeheartedly support individuals and associations engaged in such work.

Whither India? Nature Conservation in 21st Century

The dawn of Independence also witnessed the beginning of planned economic development for the country. Side by side the inauguration of Wildlife Advisory Board at the centre heralded planned efforts for conservation of nature. The development of a system of protected areas and later the launching of Project Tiger were landmarks in the progress of nature conservation in India. However, all these efforts notwithstanding, it turned out at the end of 20th century that nature in India was still beset with a number of problems. In the 1990s two studies revealed the alarming state to which nature and natural resources in the country were reduced. The first was the Citizens' Fifth Report brought out by the Centre for Science and Environment, New Delhi, and the second was 'Looking Back to Think Ahead', a report prepared by Tata Energy Research Institute. Overall they painted a picture of quantitative gains in certain areas but tremendous loss of quality of atmosphere, water, land, forest and marine resources. A very high rate of growth of population was believed to be at the root of all the problems that India faced. But while it was 2.22 p.c. in 1971-81, it had come down to 1.80 p.c. after 1991. The prediction is, it will go down further.

Available water is extremely unevenly distributed in the country. Colossal expenditure on dams and canals has not radically changed this situation. 70 to 80 p.c. of agriculture is still dependent for irrigation on ground water and not canals. Excessive exploitation of groundwater has created problems in Haryana, Rajasthan, Gujraht and Tamilnadu. As all freshwater flows are arrested, the rivers now carry loads of sewage and industrial effluents only contaminating drinking water supplies and making fresh, potable water extremely scarce. Contaminated drinking water and stagnant water bodies due to spread of irrigation have led to proliferation of infections and waterborne diseases. Land everywhere suffers from water and wind erosion

and salinity and water logging. Industrial effluents have poisoned soil and wells in many places. Use of carcinogenic insecticides has rendered vegetables, fruit, tubers etc. dangerous for human consumption. It is claimed that area under forest has expanded but commercial and other plantations have expanded at the expense of natural, indigenous forests. Good canopy forests (at least 40% canopy) are only 11% of the total forest area. There is acute scarcity of timber, fodder and other forest produce as supplies from forests cannot keep pace with increasing demands.

About 4% of the total area of the country is protected to a variety of degrees from human use. But for almost 80 p.c. of the protected areas the legal process of formation of sanctuaries and national parks is far from complete and in everyone of these, wildlife has to compete for their share of resources with human communities. In spite of the recent efforts to formulate a new wildlife protection bill and a new tribal rights bill, no viable solution is in sight to reconcile the interests of local communities and wildlife.

The post 2000 scenario has more problems to present than success stories. There are new initiatives like Gujarat proposing 6 wetland reserves, the centre planning a string of biosphere reserves, and UP proposing an elephant reserve. The Wildlife Institute of India is now propagating a landscape approach to nature conservation instead of advocating creation of more protected areas which remain isolated in many cases. Manipur government has undertaken to draft a comprehensive legislation covering Loktak Lake. It will include control of obnoxious species, rehabilitation of tribals and promotion of tourism. Sand mining which threatened Gharial habitat and marine turtles has been stopped in some areas on judicial orders.

On the other hand human and wildlife conflict has attained serious proportions in Sariska, Namdapha and in Karnataka and Tamilnadu. Tigers have been wiped out from Sariska and Namdapha reserves due to poaching which prompted Government of India to appoint a Tiger Task Force to go deeper into the problem and suggest a way out. The Task force made a number of recommendations to revamp administration and confer rights and responsibilities on local communities. Implementation of these recommendations would probably

await the passing of tribal right bill and wildlife protection legislation. In Maharashtra man-wildlife conflict mainly concerned leopards who found a viable breeding habitat in standing sugarcane. From these fields they strayed into nearby villages endangering the life of children and women. The Wildlife Department trapped a number of them and transported them to distant sanctuaries. But this is hardly a solution to the problem. Fragmentation of their habitat due to encroachment by agriculture and human settlement, blockage of their normal movement by roads, highways and reservoirs, have created this problem. These same factors affect movement of elephants whose migratory routes have been disturbed. Elephants therefore, stray into areas where they were rarely seen. They may destroy crops and threaten villagers. This man-elephant conflict has resulted in substantial numbers of elephants having been killed in Jharkhand, Orissa and around Nagarhale.

Dams, reservoirs, power projects many times fragment habitats, destroy forests and create impediments in wildlife movement. Intrusions of these and roads and highways in sanctuaries have threatened wildlife and endangered species such as Jerdon's Courser and Great Indian Bustard. Mining for bauxite has threatened Radhanagari Sanctuary and stone quarrying is worrying Kaziranga National Park. Growth of tourism and presence of tourists have created administration problems in Ranthambhor and Corbett National Park. Daily life of wildlife is then constantly disturbed. Presence of pilgrims has resulted in destruction of forest and habitats in Sabarimala and Bhimashankar sanctuaries. Andaman and Nicobar and Lakshadweep islands were also under great pressure of tourism till the tsunami disaster struck. 42 species and medicinal plants from Himalayas are threatened due to excessive exploitation for commercial purposes.

Marine and desert eco-systems have not so far been adequately covered by protected areas. Central Government's open door policy for fishing in our waters has been severely criticized by local fishermen. This policy has already resulted in a substantial decline in the annual catch, besides endangering breeding of certain fish species. Chemical industries, thermal power stations, oil installations and pipe lines have been located in our coastal areas without giving any consideration to the

needs of marine biodiversity. The resulting industrial pollution has endangered breeding and nursery areas of marine life, especially mangroves and shallow seas. They have also impacted mango and cashew plantations along the coasts. Desert biodiversity has been threatened by increasing numbers of cattle and agricultural development. The pressure of grazing animals has destroyed local flora and has encouraged the spread of weeds. Wild animals like the Chinkara have now to feed on weeds instead of their natural forage. Spread of agriculture has created problems of salinity and water-logging.

The present government has been accused of diluting the procedures of environmental impact assessment, environmental clearance of projects and public hearing. This is obviously to encourage industrialisation and quick implementation of other development projects. The National Environmental Policy being drafted by the present government has so far failed to go through the consultative process and requirements of public debate. It is said that even elected representatives and panchayats were not consulted. The policy is accused of assuming that environmental problems could be solved through market and economic instruments. Any protests and representation made to the office of the prime minister have fallen on deaf ears. It appears therefore, that the present government wants to pay only a lip-service to the cause of environmental protection and nature conservation. In such a situation no serious attempt to solve problems is expected from the authorities.

The present government and its policies neatly fall into the all-pervading paradigm of growth economics and supremacy of the market. Production of wealth is considered more important than its distribution. The result is widening of the rift between rich and poor, dominance of relative scarcities in the market and the increasing absolute scarcity of natural resources and nature's services. For the common man times will be getting more and more difficult!

What is the solution? It may be a total landscape approach streamlining land uses according to geomorphic features and natural drainage pattern. If eco-system needs and functioning of nature's services are given priority over consumer choices, the production system will be so modified as to eliminate production

of a number of intermediate goods and services. This will release resources and money for investment in natural and social capital. Market will not be necessary to maintain relative scarcity as selection of consumer choices will be dictated by needs of social welfare through a consensus of enlightened consumers and their associations. The real goal of economics, that of creating ideal conditions in a society, will be achieved. The rift between rich and poor will be narrowed. All this can happen if educational system will inculcate values and mores that recognise the importance of natural resources and conservation of nature!

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Errata

Page No.	Wrong	Correct
8	Distance wise	Distancewise
9	phoenicians	Phoenicians
10	porcelane	porcelain
13	became	become
14	christians	Christians
14	vatican	Vatican
15	Socieities	Societies
17	2/5s	2/5th
19	then	than
21	countires	colonies
31	expensive	expansive
32	Madagaskar	Madagascar
38	consequences	consequence
38	remain	remains
49	rentless	relentless
51	Janaro	Janeiro
52	abndoned	abandoned
57	intringement	infringement
57	an	on
59	arested	arrested
61	Budstard	Bustard

Back Cover

(From Top to Bottom, Left to Right)

Urban Market

Traditional Bazar, Village Market

Koyna Toad, Spot-bellied Eagle Owl, Megalomorph Spider

Snow Leopard, Indian Rock Python

Errata

Page No.	Line	Wrong	Correct
Foreword 1	14	sovenignty	sovereignty
Foreword 2	1	sovereignty	sovereignty
Foreword 2	2	voluntry	voluntary
8	6	he	be
8	38	Distance wise	Distancewise
9	28	phoenicians	Phoenicians
9	34	Etheopia	Ethiopia
10	8	moentary	monetary
10	23	porcelane	porcelain
11	24	non-existent	non-existent
12	28	industriousnes	industriousness
13	13	Century	century
13	25	became	become
14	2	christians	Christians
14	12	quesion	question
14	15	vatican	Vatican
14	22	bucaneers	buccaneers
15	27	Socieities	Societies
17	3	2/5s	2/5th
18	5	anctelope	antelope
18	33	Whie	While
19	3	then	than
20	37	intellectual	intellectual
21	27	countires	colonies
24	14	should	could
30	2	sovereignly	sovereignty
30	36	insistance	insistence
31	14	expensive	expansive
31	16	willfully	wilfully
32	22	Madagaskar	Madagascar
32	23	miynah	mynah
33	9	interention	intervention
33	26	alliances	alliances

Page No.	Line	Wrong	Correct
33	28	sysems	systems
37	37	well-healed	well-heeled
38	35	consequences	consequence
38	40	remain	remains
40	31	manuactured	manufactured
41	7	disruption	disruption
42	6	Silet	Silent
45	22	have	has
47	38	Sanctunries	Sanctuaries
48	4	Mongal	Mongol
48	31	end-angering	endangering
49	2	rentless	relentless
49	26	agricutlure	agriculture
50	21	Precutionery	Precautionary
51	7	Janaro	Janeiro
52	7	abndoned	abandoned
53	31	aministrative	administrative
55	3	environmetal	environmental
57	5	Transport	Tariffs
57	8	Mossanto	Monsanto
57	20	intringement	infringement
57	27	an	on
59	14	centruy	century
59	35	arested	arrested
60	2	Carcnogenic	Carcinogenic
60	36	Goverment	Government
61	1	right	rights
61	16	Nagarhale	Nagarhole
61	21	Budstard	Bustard
61	30	and	of
62	6	grazng	grazing
62	32	scaristics	scarcities



What kind of Economy you prefer?

1. Focusing on rate of economic growth or equitable distribution of Wealth?
2. Priority for satisfaction of peoples' basic needs through local resources or for economic growth needs through export-import?
3. Economy founded on Natural Resources and Nature's Services or on Foreign Exchange Reserves?

Nation's Welfare and Future Depend on Your Answers

